The mission of the Argonne Leadership Computing Facility (ALCF) is to provide the computational science community with a leading-edge computing capability dedicated to breakthrough science and engineering.

Operated for the U.S. Department of Energy's (DOE) Office of Science, ALCF resources make possible computationally intensive projects of the largest scale.

Major ALCF projects are selected by DOE through the Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program.

Cover images from 2007-2008 INCITE studies of buoyancy-driven turbulent nuclear burning and Type Ia supernovae. Graphics courtesy of the DOE NNSA ASC/Alliance Flash Center at the University of Chicago from research results computed in part at the Argonne Leadership Computing Facility.

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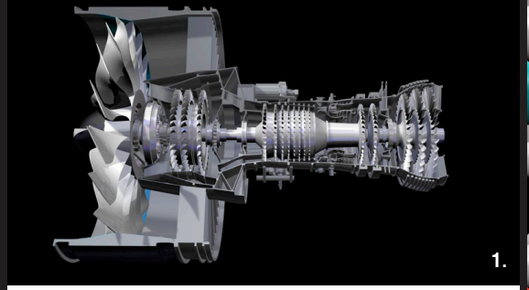
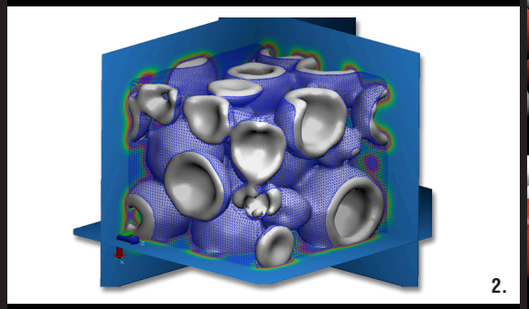
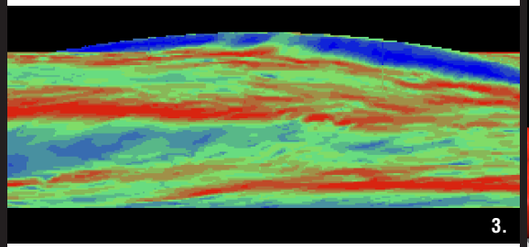
Argonne NATIONAL LABORATORY

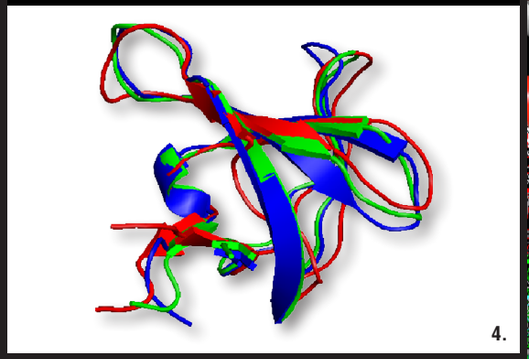
Argonne Leadership Computing Facility

Leading Computing Capability Dedicated to Breakthrough Science and Engineering



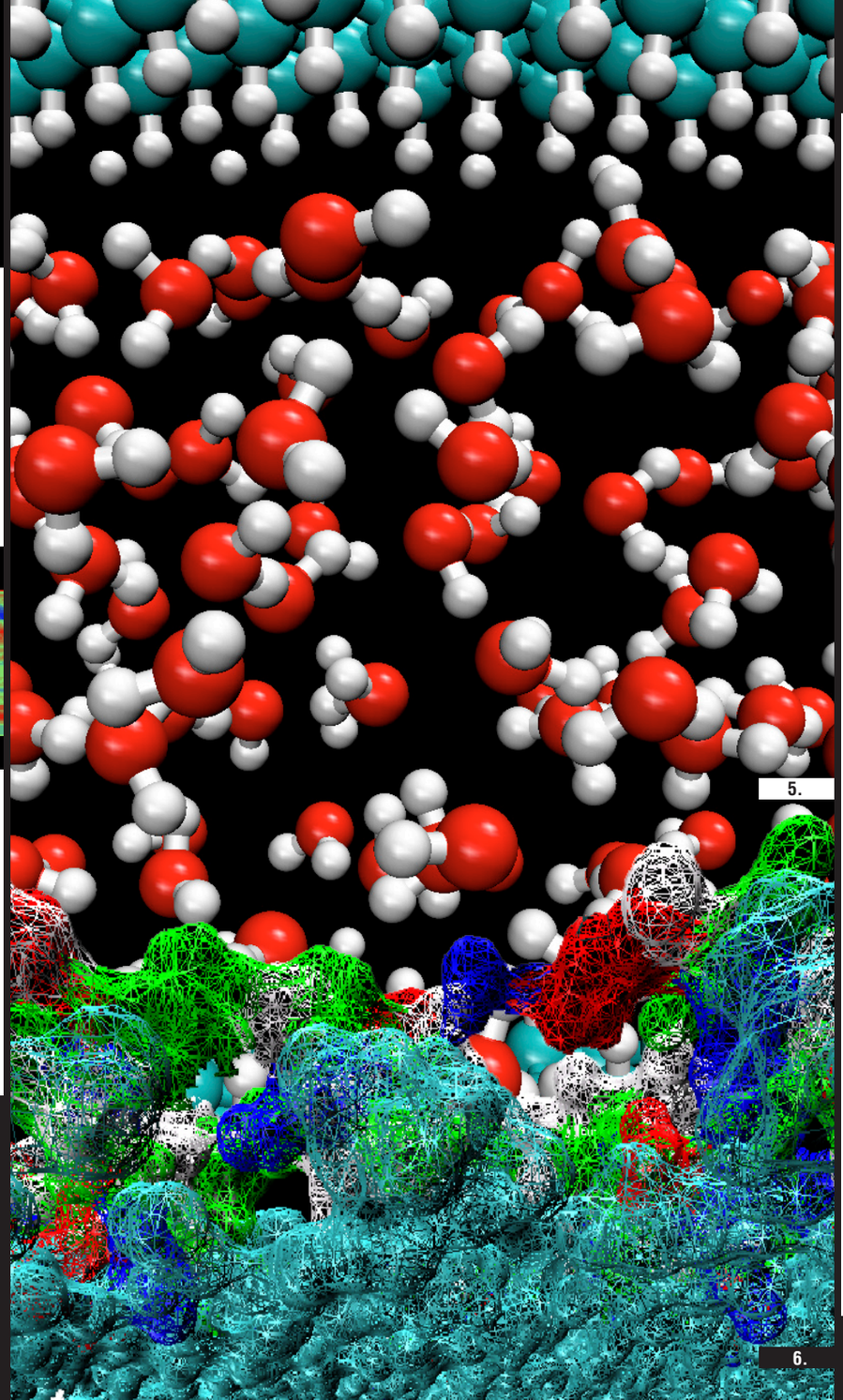






Images representing the breadth of research conducted at the ALCF, including:

1) reduced-emissions jet engine design,
2) molecular simulations of foam formation,
3) reactor core hypdronamics,
4) protein structure prediction,
5) confined water studies,
6) molecular study of Parkinson's disease progression.



Argonne Leadership Computing Facility

Enabling scientific discovery for today and tomorrow

The Argonne Leadership Computing Facility enables breakthrough science—science that will change our world through major advances in biology, chemistry, energy, engineering, climate studies, astrophysics and more.

Operated for the U.S. Department of Energy's Office of Science, the ALCF gives leading scientists access to world-class computation resources and a dedicated team of computational scientists and engineers to support their research efforts.

Work underway on twenty projects at the ALCF spans a spectrum of scientific disciplines. For example, current projects will allow researchers to:

- Understand the molecular basis of Parkinson's disease
- Assess the impact of climate change on forest ecology
- Study type Ia supernovae
- Design the next generation of reduced-emissions jet engines
- Gain insight into dangerous heart rhythm disorders
- Understand cell membrane processes in bio fuels and toxic organic waste clean up
- Study how water interacts with the surfaces of various materials

Intrepid—Argonne's Blue Gene/P

The ALCF is home to the next-generation IBM Blue Gene system, the Blue Gene/P. Aptly named, *Intrepid's* configuration features 40,960 quad-core nodes (163,840 processors) and 80 terabytes of memory. Feeding data to such a powerful system requires high-speed I/O capabilities, which are provided by 640 I/O nodes that connect to 16 storage area networks (SANs) controlling 7,680 disk drives with a total capacity of 8 petabytes and an aggregate speed of 80 gigabytes per second. *Intrepid's* peak performance of 557 teraflops and its Linpack speed of 452 teraflops make it the world's fastest computer for open science, solidifying ALCF's position as a leadership-class center for computation-driven scientific discovery.

www.alcf.anl.gov